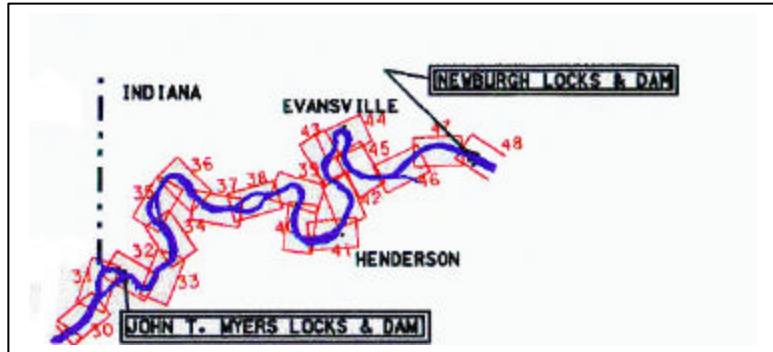


OHIO RIVER BACKWATER SHORELINE RESTORATION-MEYERS POOL (IN-06)

1.0 Location

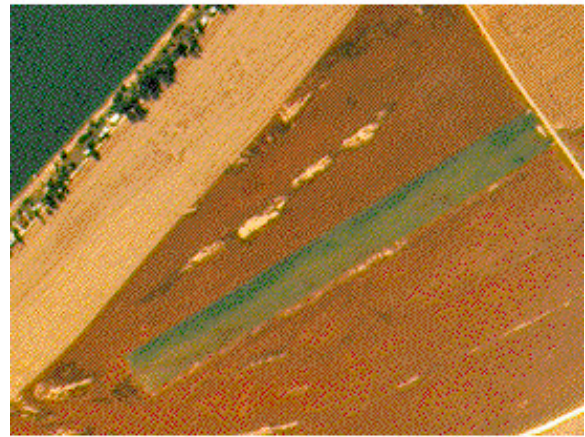
The proposed Ohio River Backwater Shoreline Restoration project is located in Posey, Vanderburgh, and Warrick Counties, Indiana. The project area encompasses backwater areas along the 70-mile Ohio River J. T. Meyers Pool. The J. T. Meyers Pool extends to the Newburgh Locks and Dam at Ohio River Mile (ORM) 776.1 from the Meyers Locks and Dam at ORM 846. The project area is within the jurisdiction of the Louisville District, U.S. Army Corps of Engineers (USACE).



2.0 Project Goal, Description, and Rationale

The primary goal of the Ohio River Backwater Shoreline Restoration project in Meyer's Pool is the reforestation of 10 miles of backwater shoreline with a 100-foot wide buffer of trees. The reforestation would enhance the area by providing seasonal habitat for fish, habitat and travel corridors for wildlife species, protection from shoreline erosion, and improve backwater habitat for aquatic, semi-aquatic, and terrestrial species. Selected backwater parcels (totaling approximately 121 acres) within the Meyers Pool would be reforested.

Backwater areas are typically comprised of tributaries that may or may not have a permanent connection to the Ohio River. Examples of backwater areas include sloughs, creeks, rivers, oxbow lakes, and drainage ditches.



Unforested backwater near ORM 785



Unforested backwater near ORM 821



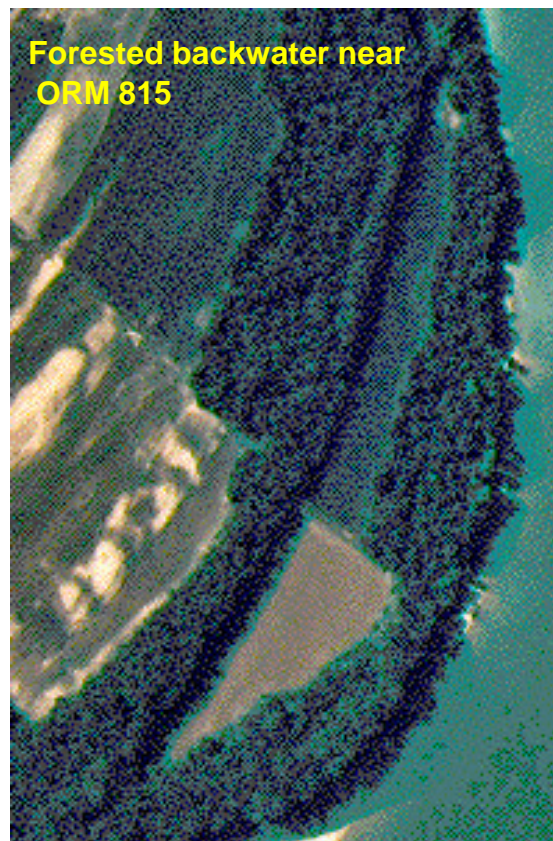
Unforested backwater near ORM 836

3.0 Existing Conditions

Terrestrial/Riparian Habitat: The backwater shoreline in Indiana along the Ohio River in the J. T. Meyers Pool contains a variety of habitat types. Agricultural lands, urban areas, undeveloped areas, and riparian forest areas are present along the Ohio River shoreline within the Meyers Pool. A variety of semi-aquatic, riparian, and terrestrial species plants and animals comprise the community adjacent to these backwater areas. Examples of backwater slough areas, within the Meyers Pool, lacking a forested buffer are depicted on the preceding page. Examples of backwaters with forested buffers are shown below.



Forested backwater near ORM 846



**Forested backwater near
ORM 815**

Aquatic Habitats: The Ohio River is the southern boundary of the project area. A variety of small to large backwater sloughs exist throughout the Ohio River floodplain within the Meyers Pool and these backwater areas support a wide variety of fishes and other aquatic species. Backwaters with permanent water provide year-round habitat to aquatic organisms whereas seasonally flooded backwaters provide temporary spawning, nursery, and feeding habitat for aquatic animals.

Wetlands: Depending on the soil conditions, hydrology, and vegetation surrounding backwater habitats some of the slough areas within the Meyers Pool contain jurisdictional wetlands within or adjacent to the backwater habitat.

Federally-Listed Threatened and Endangered Species: According to the U.S. Fish and Wildlife Service (USFWS), there are 11 federally-listed endangered species and two federally-listed threatened species known to occur in Posey, Vanderburgh, and Warrick Counties, Indiana. These species are listed on Table 1.

Table 1. Federally-listed species known to occur in Posey, Vanderburgh, and Warrick Counties, Indiana.

Common Name	Scientific Name	Federal Status	Potential Habitat Present
Indiana bat	<i>Myotis sodalis</i>	Endangered	Yes
bald eagle	<i>Haliaeetus leucocephalis</i>	Threatened	Yes
peregrine falcon	<i>Falco peregrinus</i>	Threatened	No
eastern fanshell pearly mussel	<i>Cyprogenia stegaria</i>	Endangered	No
tubercled blossom mussel	<i>Epioblasma torulosa torulosa</i>	Endangered	No
pink mucket pearly mussel	<i>Lampsilis abrupta</i>	Endangered	No
ring pink mussel	<i>Obovaria retusa</i>	Endangered	No
white wartyback mussel	<i>Plethobasus cicatricosus</i>	Endangered	No
orange-foot pimpleback mussel	<i>Plethobasus cooperianus</i>	Endangered	No
Clubshell mussel	<i>Pleurobema clava</i>	Endangered	No
rough pigtoe mussel	<i>Pleurobema plenum</i>	Endangered	No
fat pocketbook mussel	<i>Potamilus capax</i>	Endangered	No
American burying beetle	<i>Nicrophorus americanus</i>	Endangered	No
Source: U.S. Fish and Wildlife Service, 1999			

The riparian corridor adjacent to the Ohio River backwater areas may provide summer roost habitat for the Indiana bat. Preferred tree species would include a mixture of oaks (*Quercus* spp.), silver maple (*Acer saccharinum*), cottonwood (*Populus deltoides*), and shagbark hickory (*Carya ovata*) (INHS, 1996). The riparian corridor would also provide feeding/foraging habitat for the Indiana bat. The areas selected for reforestation are expected to be areas with little or no existing forest, consequently little roost habitat currently exists in the areas to be reforested.

Bald eagles and peregrine falcons may utilize forested areas adjacent to backwaters for roosting/perching habitat and feed in the open water areas. Some active nesting activity is known to occur at locations in Posey County and surrounding areas. The areas selected for reforestation are expected to be areas with little or no existing forest, consequently little roost or nesting habitat currently exists in the areas to be reforested.

All of the mussels are freshwater species that typically inhabit medium to large river systems. The mussels are typically found in habitats with substrates that range from silt to gravel, and in water depths from 0.5 to 8.0 meters. These species are generally associated with moderate to fast flowing water. There does not appear to be suitable habitat for these species in the Ohio River backwaters within of the project area.

The American burying beetle is generally associated with upland habitats such as grassland prairie, forest edge, and shrubland. It is unlikely that the beetle would be found in the Ohio River floodplain in the project area.

4.0 Project Diagram

Reforestation will be undertaken in a grid pattern at a density of 300 to 500 trees per acre within each area selected for this project as described in subsections 5.2 and 5.3. Examples of early stages of reforestation are shown in the following photographs.



Reforestation – Bald Cypress



Reforestation - Oaks

5.0 Engineering Design, Assumptions, and Requirements

5.1 Existing Ecological/Engineering Concern

A cooperative agreement with willing landowners would provide habitat improvements within the project area including the reestablishment of riparian habitat adjacent to backwaters within the Meyers Pool. This reforestation would reduce sedimentation in the backwaters, increase forest connectivity, improve habitat diversity, and improve habitat for terrestrial and aquatic species.

5.2 Backwater Reforestation

Approximately 121 acres (sections of backwater shoreline totaling 10 miles in length and 100 feet wide) of Ohio River backwater shoreline will be reforested with native mast producing bottomland hardwood trees. The reforestation will aid in the protection of Ohio River backwaters from sedimentation and reestablishment of riparian forest habitat within the project area. The reforestation will take place at multiple backwater locations throughout the Meyers Pool.

Soil types, hydrology, and terrain position will be the primary factors considered when selecting the tree species to be planted, and a detailed planting design should be developed in order to insure that the planting effort is successful. Typical bottomland species to be planted in the floodplain area would include pin oak (*Quercus palustris*), swamp chestnut oak (*Quercus michauxii*), swamp white oak (*Quercus bicolor*), pecan (*Carya illinoensis*), and shagbark hickory (*Carya ovata*). Aggressive light mast producing species, such as silver maple (*Acer saccharinum*), green ash (*Fraxinus*

pennsylvanica), sycamore (*Platanus occidentalis*), and/or willows (*Salix* spp), would be expected to regenerate naturally.

5.3 Planning/Engineering Assumptions

- Nursery stock for reforestation will be obtained from a State of Indiana Nursery or other appropriate provider.
- Planting density will be 300 to 500 trees per acre.
- Bare root seedlings will be planted in a similar manner to ongoing reforestation efforts being conducted near the Hovey Lake Fish and Wildlife Area.
- Land acquisition will not be required. A long-term land management agreement or partnership between willing landowners and Indiana DNR is the preferred plan for this project.

6.0 Cost Estimate (Construction)

Reforestation - Engineering costs for the proposed project are contained on Table 2. A detailed MCACES cost estimate for the proposed project is included in Appendix C.

Table 2. Backwater Reforestation Costs.	
Item	Cost
Development of agreements between landowners & IDNR	\$ 10,000
Preparation of Forest Management Plan/Planting Design	\$ 5,000
Mobilization	\$ 5,000
Bottomland Hardwood Reforestation (121 acres)	\$ 26,900
TOTAL	\$ 46,900

7.0 Schedule

Backwater Reforestation: The estimated construction time for this project is shown on Table 3.

Table 3. Construction Schedule.	
Item	Time
Development of agreement between landowners and IDNR	1-3 years
Preparation of Forest Management Plan/Planting Design	1 year
Bottomland Hardwood Reforestation (727 acres)	1-5 years
TOTAL	5 Years

8.0 Expected Ecological Benefits

Terrestrial/Riparian Habitats: The implementation of the proposed project could provide beneficial impacts to terrestrial and riparian resources in the area. Riparian reforestation would stabilize the soil thereby reducing erosion and subsequent sedimentation within the backwaters. Reforestation would reduce the amount of forest fragmentation, provide habitat for resident species, and benefit a number of neotropical migrant birds. Reforestation would enhance travel corridors for resident and migratory species.

Aquatic Habitats: Reforestation of the riparian buffer along the backwater areas would reduce soil erosion. Reduced soil erosion would potentially increase the life span of the backwaters by reducing sedimentation and would benefit freshwater species in the area due to decreased sediments entering the water column.

Wetlands: Riparian reforestation would protect existing wetlands associated with backwater habitats and would potentially result in an increase in wetland habitat if some of the reforestation occurred in areas that have the proper hydrology.

Federally-Listed Threatened and Endangered Species: Reforestation of the project site could potentially benefit the Indiana bat, bald eagle, and peregrine falcon. Successful reforestation would provide potential summer roosting habitat for the Indiana bat, and potential roosting/perching habitat for the bald eagle and peregrine falcon. Improved water quality would be considered beneficial to federally-listed endangered mussel species. No beneficial impacts would be anticipated for the American burying beetle as a result of implementing the proposed project.

Socioeconomic Resources: There would be no reasonably foreseeable beneficial impacts to socioeconomic resources as a result of implementing the proposed project.

9.0 Potential Adverse Environmental Impacts

Terrestrial/Riparian Habitats: There would be no foreseeable adverse impacts to terrestrial or riparian resources as a result of implementing the proposed project.

Aquatic Habitats: There would be no foreseeable adverse impacts to aquatic resources as a result of implementing the proposed project.

Wetlands: There would be no foreseeable adverse impacts to jurisdictional wetlands as a result of implementing the proposed project.

Federally-Listed Threatened and Endangered Species: There would be no foreseeable adverse impacts to federally-listed threatened or endangered species as a result of implementing the proposed project.

Socioeconomic Resources: There would be the potential for minor long-term adverse impacts to socioeconomic resources as a result of implementing the Meyers Pool Backwater Shoreline Restoration Project. The long-term impacts would be associated with the conversion of floodplain agricultural lands to bottomland hardwood forest.

10.0 Mitigation

The conversion of agricultural and/or undeveloped land to forested land would not require mitigation. The use of best management practices during the reforestation planting activities would minimize any potential impacts associated with the planting of trees in the project area.

11.0 Preliminary Operation and Maintenance Costs:

The operation and maintenance costs associated with the Meyers Pool Backwater Shoreline Habitat Restoration project would be correlated to the amount of active management on the area. Labor associated with wildlife management of the project area would be the primary cost associated with the long-term maintenance of the area. Minor secondary plantings/replanting may also be required depending upon the success of the original reforestation.

12.0 Potential Cost Share Sponsor(s)

- ◆ Indiana Department of Natural Resources
- ◆ The Nature Conservancy
- ◆ Ducks Unlimited
- ◆ Local Government
- ◆ County Government
- ◆ Local Economic Development Council
- ◆ Indiana Bass Federation
- ◆ Local BASS chapters
- ◆ Private corporations
- ◆ Local marinas

13.0 Expected Life of the Project

It is anticipated that the Meyers Pool Backwater Shoreline Restoration project area will be managed for natural resources by the Indiana DNR and willing landowners in perpetuity.

14.0 Hazardous, Toxic, and Radiological Waste Considerations

Potential impacts of hazardous, toxic, and radiological waste (HTRW) at the site were visually assessed during a site visit.

Site Inspection Findings.

The project involves 70 miles of Indiana backwater shoreline along the Ohio River from ORM 846 to 776.1. Indiana towns or cities located along the shoreline are Hovey at ORM 833, Mount Vernon at ORM 830, West Franklin at ORM 817, Cypress at ORM 798, Evansville between ORM 795 to 791, and Newburgh at ORM 778.

Only portions of the potential backwater habitats were investigated. The following environmental conditions were considered when conducting the June 30, 1999 project area inspection:

- | | |
|--------------------------------------|-----------------------------|
| ◆ Suspicious/Unusual Odors; | ◆ Impoundments/Lagoons; |
| ◆ Discolored Soil; | ◆ Drum/Container Storage; |
| ◆ Distressed Vegetation; | ◆ Electrical Transformers; |
| ◆ Dirt/Debris Mounds; | ◆ Standpipes/Vent pipes; |
| ◆ Ground Depressions; | ◆ Surface Water Discharges; |
| ◆ Oil Staining; | ◆ Power or Pipelines; |
| ◆ Above Ground Storage Tanks (ASTs); | ◆ Mining/Logging; and |
| ◆ Underground Storage Tanks (USTs); | ◆ Other. |
| ◆ Landfills/Wastepiles; | |

None of the environmental conditions listed above were observed on the portions of the project area that were inspected. A more comprehensive site inspection including an HTRW database search should be conducted at specific restoration sites if land acquisition is considered.

15.0 Property Ownership & River Access

The proposed project area covers a large geographical area. Specific properties for reforestation of the Ohio River Backwater Shoreline Restoration project have not been identified. Decisions on site selection would need to be made before further work could be accomplished. Land acquisitions or easements/agreements with current property owners would need to be investigated.

Based on estimates of cost/acre for other sites in Posey and Warrick Counties, Indiana, cost estimates for land acquisition on this site could range between \$100.00 per acre and \$1000.00 per acre. Local real estate brokers could provide a more accurate estimate of actual land values. It is anticipated that easements/management agreements would be less costly than acquisition.

16.0 References

INHS, 1996	Illinois Natural History Survey Reports, March-April 1996. Survey Document #2152. Center for Biodiversity (J. Hofmann).
USFWS, 1983	U.S. Fish and Wildlife Service, 1983. Northern States Bald Eagle Recovery Plan. USFWS Denver, Colorado
USFWS, 1983	U.S. Fish and Wildlife Service, 1983. Recovery Plan for the Indiana bat (<i>Myotis sodalis</i>).
USFWS, 1984	U.S. Fish and Wildlife Service, 1984. Recovery Plan for the Orange-footed Pearly Mussel, <i>Pleurobema cooperianus</i> . Prepared by S. Ahlstedt for USFWS Region 4 August 30, 1984. 46pp.
USFWS, 1985	U.S. Fish and Wildlife Service, 1985. Recovery Plan for the Tubercled-blossom Pearly Mussel, <i>Epioblasma torulosa torulosa</i> , Turgid-blossom Pearly Mussel, <i>Epioblasma turgidula</i> , Yellow-blossom Pearly Mussel, <i>Epioblasma florentina florentina</i> . USFWS Atlanta, Georgia. 42pp.
USFWS, 1985	U.S. Fish and Wildlife Service, 1996. Recovery plan for the pink mucket pearly mussel. USFWS Atlanta, Georgia.
USFWS, 1991	U.S. Fish and Wildlife Service, 1991. Recovery Plan for Ring Pink Mussel (<i>Obovaria retusa</i>). Prepared by R.G. Biggins for the Southeast Region USFWS February, 1991. 24pp.
USFWS, 1991	U.S. Fish and Wildlife Service, 1991. Fanshell Recovery Plan. Prepared by R.G. Biggins for the Southeast Region USFWS July 9, 1991. 37pp.
USFWS, 1994	Recovery Plan for the Clubshell (<i>Pleurobema clava</i>), Northern Riffleshell (<i>Epioblasma torulosa rangiana</i>). Prepared by G.T. Watters for USFWS Region 5, Hadley, Massachusetts. 57pp.
USFWS, 1997	U.S. Fish and Wildlife Service, 1997. Species Accounts: pink mucket pearly mussel (<i>Lampsilis abrupta</i>).
USFWS, 1999	U.S. Fish and Wildlife Service, July 1, 1999. Federally Listed Endangered and Threatened Species in Indiana.

APPENDIX A Threatened & Endangered Species

APPENDIX B Plan Formulation and Incremental Analysis Checklist**Project Site Location:**

The proposed Ohio River Backwater Shoreline Restoration project is located in Posey, Vanderburgh, and Warrick Counties, Indiana. The project area encompasses backwater areas along the 70-mile Ohio River J. T. Meyers Pool. The J. T. Meyers Pool extends to the Newburgh Locks and Dam at Ohio River Mile (ORM) 776.1 from the Meyers Locks and Dam at ORM 846. The project area is within the jurisdiction of the Louisville District, U.S. Army Corps of Engineers (USACE).

Description of Plan Selected:

The primary goal of the Ohio River Backwater Shoreline Restoration project in Meyer's Pool is the reforestation of 10 miles of backwater shoreline with a 100-foot wide buffer of trees. The reforestation would enhance the area by providing seasonal habitat for fish, habitat and travel corridors for wildlife species, protection from shoreline erosion, and improve backwater habitat for aquatic, semi-aquatic, and terrestrial species. Selected backwater parcels (totaling approximately 121 acres) within the Meyers Pool would be reforested.

Alternatives of the Selected Plan:

Smaller Size Plans Possible? **Yes Reduce the extent of reforestation.**

Larger Size Plan Possible? **Yes Increase the extent of reforestation.**

Other alternatives? **No**

Restore/Enhance/Protect Terrestrial Habitats? ☒ **Objective numbers met** ☒ T1 & T3

Restore, Enhance, & Protect Wetlands? ☒ **Objective numbers met** ☒ W1

Restore/Enhance/Protect Aquatic Habitats? ☒ **Objective numbers met** ☒ A1

Type species benefited: Variety of terrestrial, and floodplain plants and animals.

Endangered species benefited: Possibly bald eagle, peregrine falcon, and Indiana bat.

Can estimated amount of habitat units be determined: Approximately 121 acres of backwater shoreline riparian habitat will be restored.

Plan acceptable to Resources Agencies?

U.S. Fish & Wildlife Service?

State Department of Natural Resources? Yes Indiana DNR

Plan considered complete? **Connected to other plans for restoration?**

Real Estate owned by State Agency? No **Federal Agency?** No

Real Estate privately owned? Yes

If privately owned, what is status of future acquisition Agreements with willing landowners will be required for this project.

Does this plan contribute significantly to the ecosystem structure or function requiring restoration? What goal or values does it meet in the Ecosystem Restoration Plan?

The reforestation will aid in the protection of the eroding Ohio River back channels, backwater sedimentation reduction, flood desynchronization and reestablishment of riparian forest habitat within the project area.

Is this restoration plan a part of restoration projects planned by other agencies? (i.e. North American Waterfowl Management Plan, etc.)

No

In agencies opinion is the plan the most cost effective plan that can be implemented at this location?

Can this plan be implemented more cost effectively by another agency or institution?

Yes / No

Who:

From an incremental cost basis are there any features in this plan that would make the project more expensive than a typical project of the same nature? For embayment type plans is there excessive haul distance to disposal site? More expensive type disposal? Spoil that requires special handling/disposal?

Potential Project Sponsor:

Government Entity:_____

Non-government Entity _____

Corps Contractor _____ Date _____

U.S. Fish & Wildlife Representative _____ Date _____

State Agency Representative _____ Date _____

U.S. Army Corps of Engineers Representative _____ Date _____

Terrestrial Habitat Objectives

- T1 Riparian Corridors
- T2 Islands
- T3 Floodplains
- T4 Other unique habitats (canebrakes, river bluffs, etc.)

Wetland Habitat Objectives

- W1 Forested Wetlands: Bottomland Hardwoods
- W2 Forested Wetlands: Cypress/Tupelo Swamps and other unique forested wetlands
- W3 Scrub/Shrub Emergent Wetlands: isolated from the river except during high water and contiguous (includes scrub/shrub wetlands in embayments and island sloughs)

Aquatic Habitat Objectives

- A1 Backwaters (sloughs, embayments, oxbows, bayous, etc.)
- A2 Riverine submerged and aquatic vegetation
- A3 Sand and gravel bars
- A4 Riffles/Runs (tailwaters)
- A5 Pools (deep water, slow velocity, soft substrate)
- A6 Side Channel/Back Channel Habitat
- A7 Fish Passage
- A8 Riparian Enhancement/Protection

APPENDIX C Micro Computer-Aided Cost Engineering System (MCACES)